

# ***Headquarters U.S. Air Force***

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*Integrity - Service - Excellence*

## **Sustainability and Green Remediation The Air Force Civil Engineering Perspective**

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**Year of the Air Force  
Family**



**15 June 2010**

Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE <b>15 JUN 2010</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2010 to 00-00-2010</b>	
4. TITLE AND SUBTITLE <b>Sustainability and Green Remediation The Air Force Civil Engineering Perspective</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Air Force Center for Engineering and the Environment, 2261 Hughes Ave, Lackland AFB, TX, 78236-9853</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>Presented at the NDIA Environment, Energy Security &amp; Sustainability (E2S2) Symposium &amp; Exhibition held 14-17 June 2010 in Denver, CO.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>23</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			



- **Implementing Current Directives**
  - **New Facilities**
  - **Existing Facilities**
- **Holistic Approach**
  - **Sustainable Communities**
- **Green & Sustainable Cleanup**
- **Success Stories**
- **Opportunities**

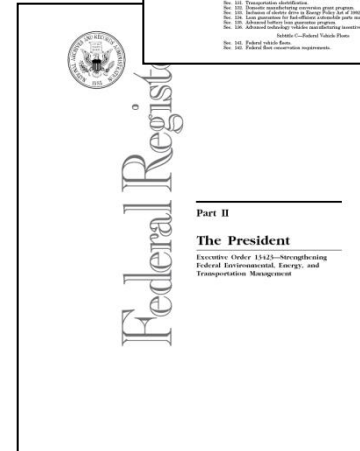
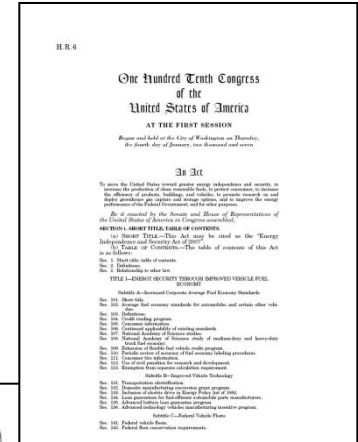


... necessary components for success!



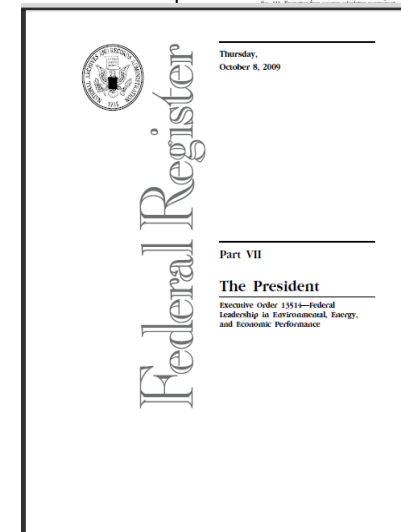
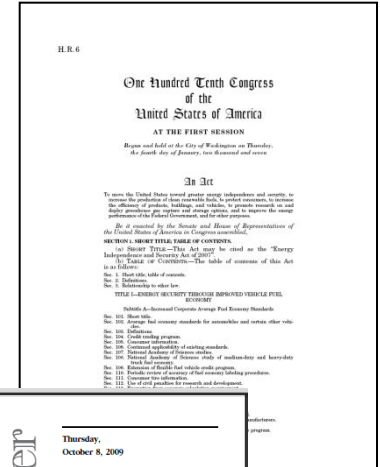
# Current Directives

- **Energy Policy Act of 2005 (EPAct05) – Aug 05**
  - New facilities, 30% more efficient than ASHRAE 90.1
  - Installation of advanced meters
- **Executive Order (EO) 13423 – Jan 07**
  - Reduce Energy Consumption 30% by 2015
  - Reduce Water use 16% by 2015
  - All new construction must incorporate High Performance and Sustainable Buildings (HPSB) Guiding Principles (per Fed MOU – Jan 06)
  - 15% of existing buildings must be HPSB by 2015





- **Energy Independence and Security Act of 2007 (EISA07) – Dec 07**
  - New buildings reduce fossil fuel generated energy 55% by 2010 to 100% by 2030
  - 30% hot water supplied by solar water heaters
  - Restore predevelopment hydrology
- **EO 13514, Leadership in Environmental, Energy, and Economic Performance expands requirements of EO 13423 – Oct 09**
  - GHG reporting requirements for scope 1, 2, & 3
  - Each agency shall develop, implement, and annually update an integrated Strategic Sustainability Performance Plan



***Multiple requirements require multiple surveys, fragmented compliance paths & potential duplication of effort***



# New Facilities Air Force Sustainable Policy

- Current policy issued July 07
- Key requirements
  - All MILCON vertical facilities shall be *capable of achieving LEED "Silver"*
  - Incorporates EPAct05 and EO 13423 requirements
  - FY09: 5% of total MILCON LEED certified
  - FY10/later: 10% LEED certified
- Policy currently in re-write

ATTACHMENT 1  
LEED<sup>TM</sup> NC, v2.2 Project Checklist

LEED NC v2.2 Sustainable Sites	14 Possible Points
SS Credit 1: Construction Activity Pollution Prevention	Required
SS Credit 2: Site Selection	1
SS Credit 3: Development Density & Community Connectivity	1
SS Credit 4: Alternative Transportation: Public Transportation Access	1
SS Credit 5: Alternative Transportation: Bicycle Storage & Changing Room	1
SS Credit 6: Alternative Transportation: Low Emitting & Fuel Efficient	1
SS Credit 7: Alternative Transportation: Parking Capacity	1
SS Credit 8: Stormwater Management: Protection of Existing Features	1
SS Credit 9: Stormwater Management: Maximum Open Space	1
SS Credit 10: Stormwater Management: Quantity Control	1
SS Credit 11: Stormwater Management: Quality Control	1
SS Credit 12: Heat Island Effect: Non-Roof	1
SS Credit 13: Heat Island Effect: Roof	1
SS Credit 14: Light Pollution Reduction	1
<b>Water Efficiency</b>	<b>5 Possible Points</b>
WE Credit 1.1: Water Efficient Landscaping: Reduce by 50%	1
WE Credit 1.2: Water Efficient Landscaping: No Potable Water Use	1
WE Credit 2: Innovative Wateruse Technologies	1
WE Credit 3.1: Water Use Reduction: 20% Reduction	1
WE Credit 3.2: Water Use Reduction: 30% Reduction	1
<b>Energy &amp; Atmosphere</b>	<b>17 Possible Points</b>
EA Prerequisite 1: Fundamental Commissioning of the Building Energy Systems	Required
EA Prerequisite 2: Minimum Energy Performance	Required
EA Prerequisite 3: Fundamental Refrigerant Management	Required
EA Credit 1: Optimize Energy Performance	1-3
EA Credit 2: On-Site Renewable Energy	1
EA Credit 3: Enhanced Commissioning	1
EA Credit 4: Enhanced Refrigerant Management	1
EA Credit 5: Measurement & Verification	1
EA Credit 6: Green Power	1
<b>Materials &amp; Resources</b>	<b>13 Possible Points</b>
MR Prerequisite 1: Storage & Collection of Recyclables	Required
MR Credit 1.1: Building Reuse: Minimum 75% of Existing Walls, Floor, Roof	1
MR Credit 1.2: Building Reuse: Minimum 85% of Existing Walls, Floor, Roof	1
MR Credit 2.1: Construction Waste Management: Divert 75% from Landfill	1
MR Credit 2.2: Construction Waste Management: Divert 75% from Landfill	1
MR Credit 3.1: Materials Reuse: 5%	1
MR Credit 3.2: Materials Reuse: 10%	1
MR Credit 4.1: Recycle Content: 10% (post-consumer + 1% pre-consumer)	1
MR Credit 4.2: Recycle Content: 20% (post-consumer + 1% pre-consumer)	1
MR Credit 5.1: Regional Materials: 10% Extracted, Processed & Manufactured Regionally	1
MR Credit 5.2: Regional Materials: 20% Extracted, Processed & Manufactured Regionally	1
MR Credit 6: Recycled Content: 10%	1

Old 19-41 points      Platinum 12-49 points



# ***Existing Facilities***

## ***HPSB Pilot Study***

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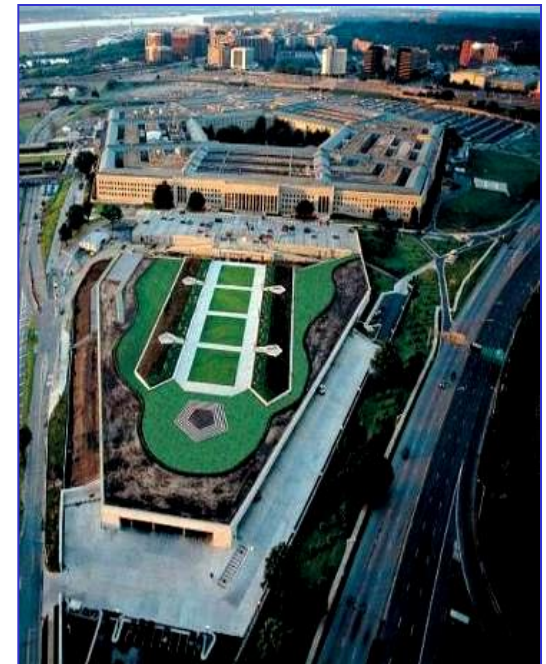
- **15% of existing building inventory must be HPSB by 2015**
- **AF MILCON produces approximately 50-70 new facilities per year**
  - **Will not reach 2015 goal with new construction alone!**
- **AFCEE conducted initial test for HPSB surveys**
  - **5 AF installations: 30 buildings surveyed**
  - **Each building has ~ 40 aspects**
  - **Over 75% of HPSB aspects are installation-wide aspects**
  - **Average score: 70%**
  - **Requirements more difficult to achieve are:**

Energy Efficiency	Water Conservation
Metering	Commissioning
Daylighting	Thermal Comfort
Ventilation	





- Multiple federal *sustainability* requirements
- All establish multiple goals for energy reduction, water reduction, storm water management, use of renewable energy, etc.
- Requirements frequently overlap/conflict
- Synergies between HPSB and existing audits and programs
- **Opportunity to identify a compliance strategy holistically**



*Align compliance paths to minimize reporting burden*





# ***A Holistic Approach***

## ***HPSB Efficiencies***

### **Building-by-building approach**

- Each building has ~40 HPSB aspects
- Many aspects are the same for every building on the installation
- Must perform energy & water calculations/modeling on every applicable building

**Requires ~ 840,000 data points**

### **Installation approach**

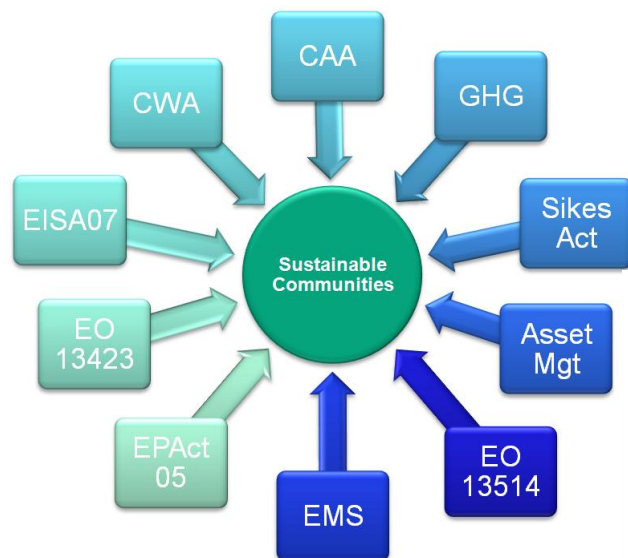
- **Each installation has ~30 HPSB aspects**
- Transfer requirements for energy & water reductions to the installation
- Augment successful Energy Audit program to address energy & water performance at the building level

**Reduces burden to ~70, 000 data points**

***Approaching requirement by SF vs. number of buildings, the 15% HPSB goal for AF could be met by as few as 184 facilities***



# Sustainable Communities Consolidating Across Programs



*Ideal world – work all requirements under one umbrella*



# Sustainable Communities

## Categories & Scorecard Snapshot

COMMUNITY  
DESIGN &  
DEVELOPMENT

ENERGY &  
GREENHOUSE GAS  
EMISSIONS

WATER EFFICIENCY

NATURAL  
INFRASTRUCTURE

BUILT  
INFRASTRUCTURE

MISSION  
READINESS

MATERIALS &  
WASTE  
MANAGEMENT

TRANSPORTATION

COMMUNITY  
ENGAGEMENT

INNOVATION &  
REGIONAL

### Sustainable Communities Scorecard

Installation Name:

Location:

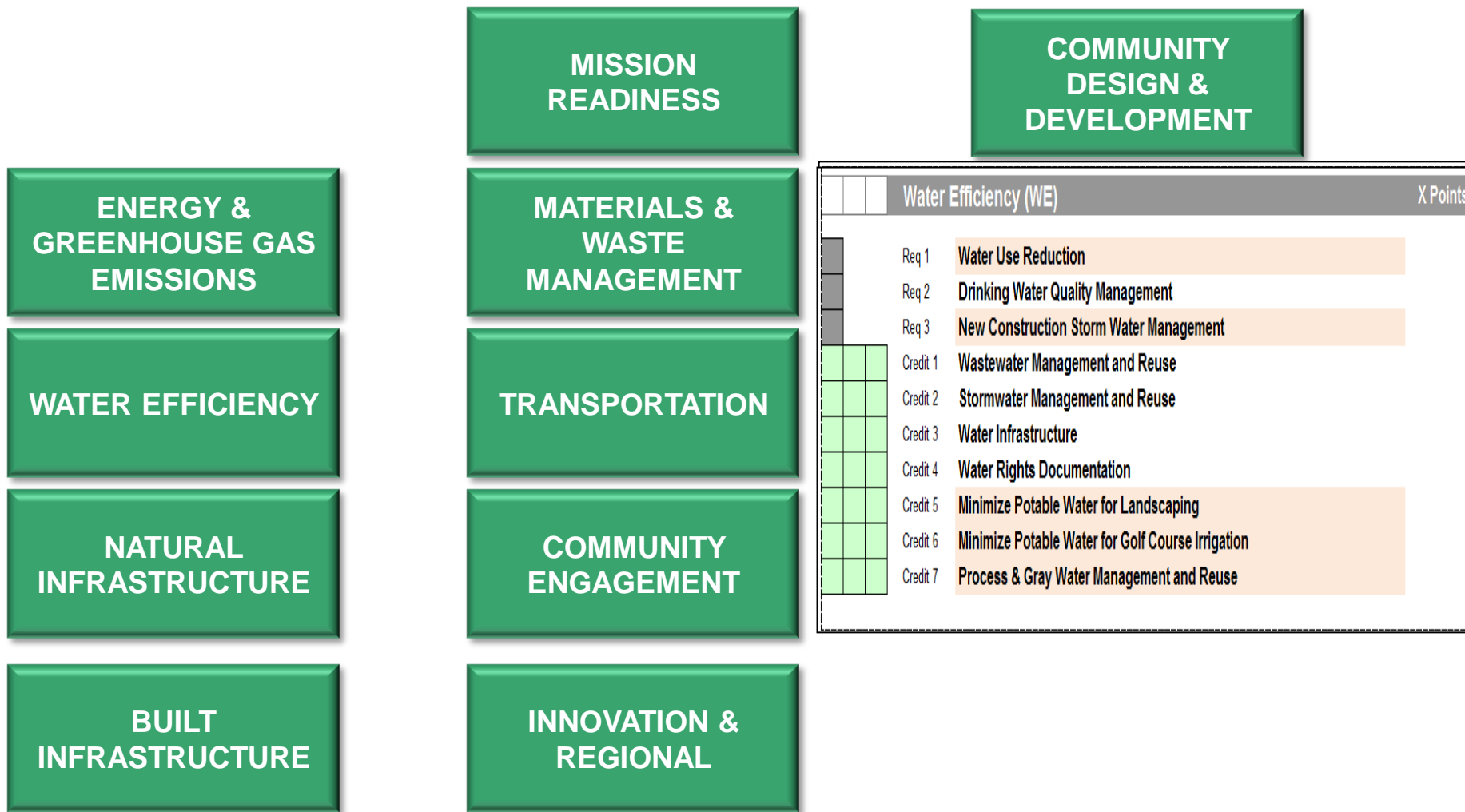
Yes ? No

Community Design & Development (CDD)		X Points
Req 1	EMS Conformance	
Req 2	Asset Master Plan	
Req 3	Installation Planning Profile	
Credit 1	Sustainable Design Standards	
Credit 2	Effective Land Use	
Credit 3	Development Near Existing Infrastructure	
Credit 4	Choices for Getting Around	
Credit 5	Shared Use Pathway Network	
Credit 6	Brownfield Redevelopment	
Credit 7	Demolition	
Credit 8	Heat Island Effect: Installation	
Credit 9	Light Pollution: Installation	



# Sustainable Communities

## Categories & Scorecard Snapshot



Categories defined by *Requirements* and *Credits*



## Scorecard & Credit Template

[illegible]

## Points



# ***Green & Sustainable Remediation (GSR)***

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- **Cleanup from past AF communities must be done in a Green and Sustainable manner**
  - AF Environmental Remediation Program (ERP) Office of the Secretary of Defense (OSD) Policy on GSR 2009
  - AF ERP- Optimization (ERP-O) process 2009
- **Overarching goal – is still to protect human health and the environment**
- **Objective – Incorporate GSR *technologies* as part of holistic approach to *optimize* cleanup**
  - *Technology-driven (green)*
  - *Process-centric (sustainment)*



# ***Green and Sustainable Remediation (GSR)***

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- **Key elements of the GSR initiative to minimize:**
  - Energy use for treatment systems
  - Water use/impacts on water resources
  - Material consumption/waste generation
  - Impacts on land and ecosystem
  - Air emissions
- **GSR Strategy is Technology Focused - Use low energy intensive, green remediation technologies to:**
  - Protect human and environment
  - Reduce environmental footprint
  - Improve performance
  - Serve as environmental stewards for future generations

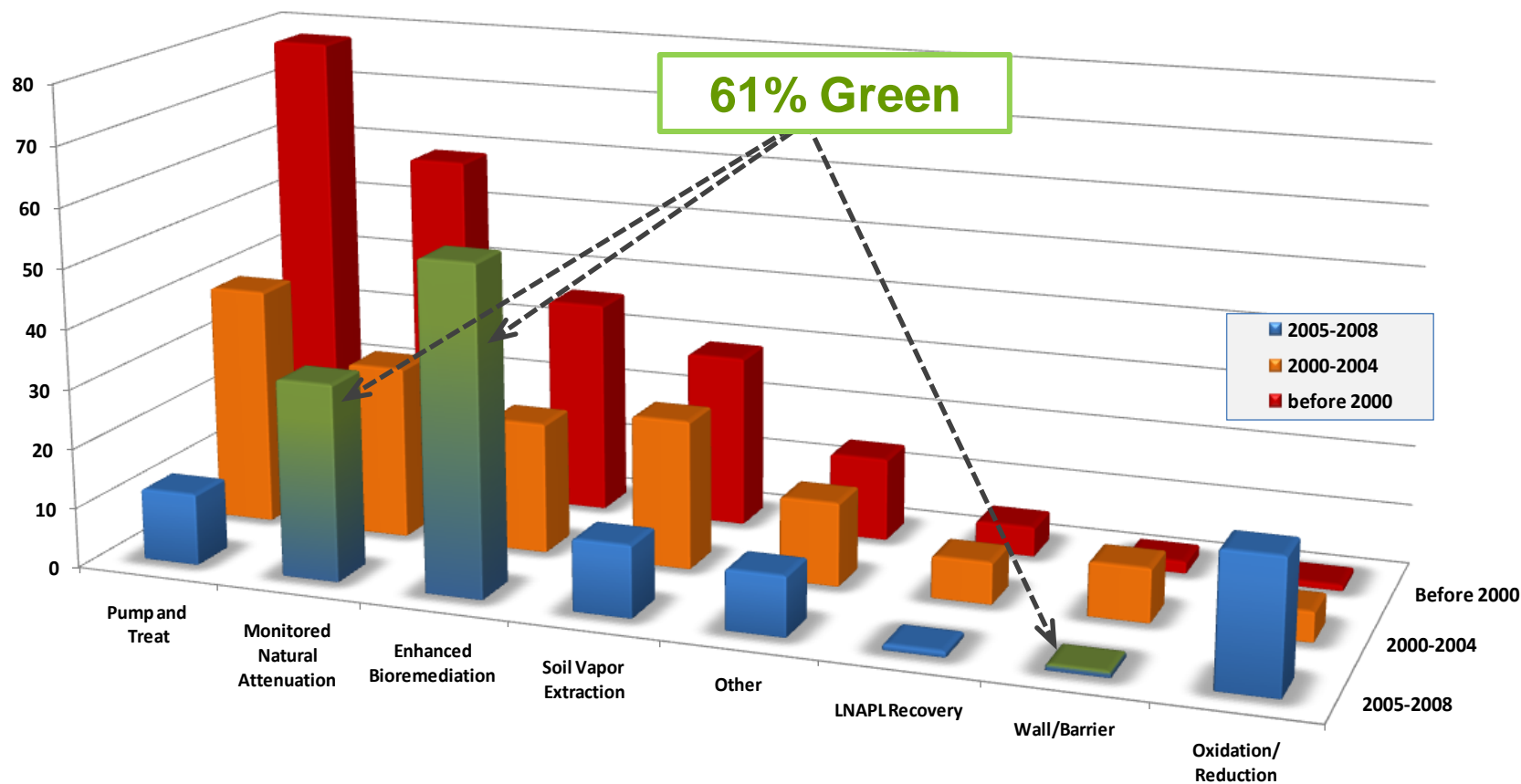




# GSR Technology Trends

## Remediation Systems by Year

Executive Order (EO) 13423 – 2007  
AF Sustainable Remediation Initiative - 2007



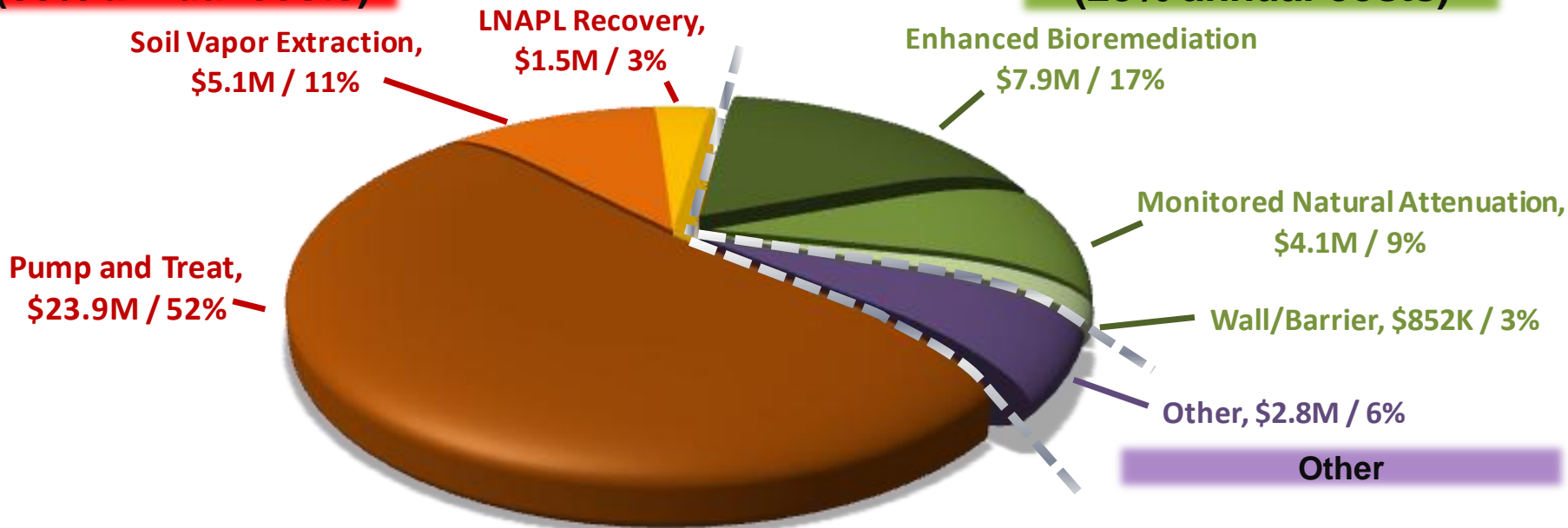


# AF Remediation System Annual Costs by Technology

38% 381 Remedial Systems in Operation\* 48%

**Energy Intensive  
(66% annual costs)**

**Low Energy / Passive  
(28% annual costs)**



\*Based on FY08 EDITT System  
Inventory as of 15 March 2010



# ***AF GSR Strategy***

## ***Technology Focus***

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### ■ **Formulate The Need (Air Force needs)**

- Annual process, engaging AFCEE, Air Staff, MAJCOMs, installations

### ■ **Demonstrate The Potential (promising opportunities)**

- Connect needs to solutions
- Includes COTS, technology transfer, new solutions

### ■ **Validate The Technology (early resources)**

- Cost & Performance data, engineering/design/application guides, professional reviews
- Joint AFCEE and user to dem/val with eye to implementability

### ■ **Educate The Enterprise – (environmental professionals)**

- Technology transfer throughout
- Tools: publications, presentations, technical consultation, guides and manuals, training events, strategic partnerships



# Air Force Success Stories

- **Nellis AFB PV System**
  - 6<sup>th</sup> largest PV array in North America
- **EPA Green Power Partnership**
  - Top federal agency for renewable energy (4% of total electricity, Apr 10)
- **AF MILCON Program**
  - AF Weather Agency – 1<sup>st</sup> LEED Gold in the AF
  - Keesler Housing – 736 LEED Silver homes
- **Natural Resources**
  - Solid Waste Diversion (2007), 62%
  - HAZWASTE disposal reduction (1996-present), 33%
  - Toxic Release Inventory reduction (2001-2006), 34%
  - Ozone Depleting Substance elimination (1990-present), 96%
  - Water Reduction (FY01-FY07), 32%



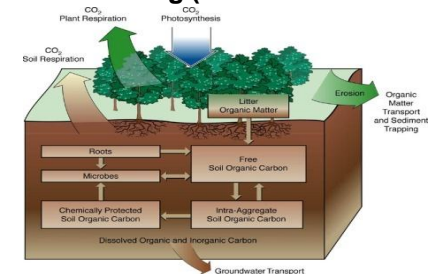
70,000 panels



AF Weather Agency – 1<sup>st</sup> LEED Gold



Keesler Housing (736 LEED Silver Homes)





# Air Force Success Stories (GSR)

- Beginning to purposefully analyze sustainability as part of selection criteria for new remediation systems and optimization
- MMR, MA - Wind turbine to power groundwater cleanup
- Altus AFB, OK - Solar-powered in situ bioreactor; biowall replaces pump-and-treat
- Kennedy Space Center, FL – Solar-powered recirculation system
- Travis AFB, CA - Solar-powered pumps for pump-and-treat system; in situ bioreactor
- Hickam AB, HI - Solar-powered in situ reactor
- Patrick AFB, FL - Solar-powered aerator





# Upcoming Opportunities Construction

- Approx 300 AF projects LEED registered, seeking certification
- Execution of Energy and HPSB audits / data collection
- Future Energy and HPSB projects resulting from audits
- Broad Agency Announcements (BAA)



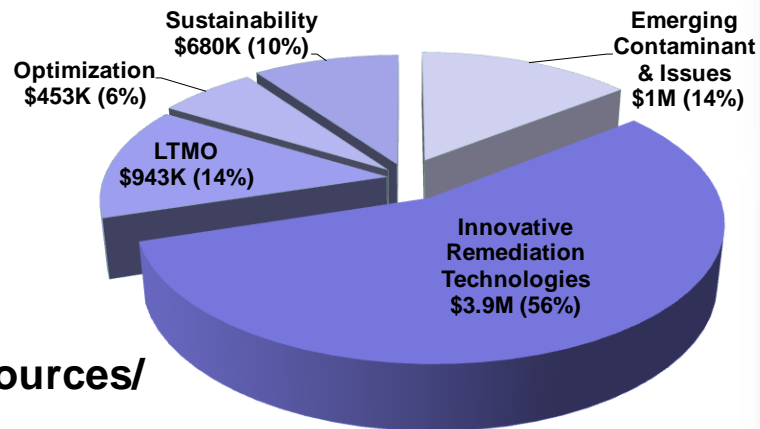




# Upcoming Opportunities Environmental Restoration

## Broad Agency Announcement (BAA) for USAF Environmental Restoration Program Innovation

- Contract mechanism for demonstrate/validate of innovative technologies
  - Identify BETTER, FASTER, CHEAPER, & GREENER solutions
  - Appears in FedBizOps: needs, dates, and details
  - Awards based on: technical merits and broad spread application
  - \$3M-\$4M/yr AFCEE -- leveraged -- \$36M (total) SERDP/ESTCP
  - Bases integrated into process: needs, evaluation, site selection
  - Access at [www.afcee.af.mil/resources/technologytransfer/baa](http://www.afcee.af.mil/resources/technologytransfer/baa)







# ***Upcoming Opportunities Environmental Compliance***

<b>Program</b>	<b>FY11 Program Amount (\$M)</b>
Air Quality	\$ 31.2
Cultural Resources	\$ 11.6
Environmental Quality Program Support	\$ 65.8
Hazmat/Hazwaste/Toxics	\$ 94.5
Natural Resources	\$ 4.6 K
NEPA	\$ 16.6
Ranges	\$ 0.5
Water Quality	\$ 26.9

**Mostly Executed At Installation Levels...Communicate!!!  
So We Don't Lose Out On These Opportunities!**



# *Just a thought . . .*

**“Nothing is as powerful as an idea whose time has come.”**

***Victor Hugo***

